

MISCELLANEOUS REPORT NO. 2

8.7101

FOREST TYPES AND CONDITION CLASSES

IN THE LAKE STATES

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Lake States Forest Experiment Station

June 1948

FOREST TYPES AND CONDITION CLASSES

IN THE LAKE STATES 1/

June 4, 1948

General Considerations

1. To make it possible to interchange survey data between National Forests, State Forests, and private companies, and to permit combining these into comprehensive summaries by counties, survey districts, and entire states, uniformity in definitions and standards is necessary!
2. Uniform symbols for forest-type maps would be desirable but may not be possible in every case. This is not nearly as important as having uniform definition of types and strict adherence to accepted specifications in mapping.
3. Mapping of forest areas by size classes and densities has two purposes. It enables the forest manager to locate his areas of good, fair, and merchantable saw timber and pulpwood, and pick out areas needing planting or thinning. Secondly, the mapping serves to stratify the area into fairly homogeneous tracts which can be sampled for volume with a few sample plots. For both these purposes it is desirable to have the size classes and densities fairly uniform as regards volume per acre (or, in the case of seedlings and saplings, number of trees per acre).
4. On the other hand, much of the mapping will be done from air photos and the sizes and stocking classes will have to be defined in such a way that they can be identified from the pictures.
5. Many Lake States timber stands are made up of two or more definite layers and can be accurately described only by using compound symbols. However, in compiling acreage from the type maps the areas presumably will be classified only on the basis of what constitutes the main stand. Thus some system is required in compound types to designate the main stand.
6. The number of basic condition classes must be limited or an excessive number of classes will make sampling expensive. It is believed that twelve basic types, four size classes, and three volume classes will be a workable number and will insure reasonably homogeneous classes. Should further subdivision be required, subtypes or subclasses may be used.
7. It is important that no hybrid types, such as aspen-balsam fir, and no overlapping size classifications, such as 3-9 or 9-12, be employed.

1/ In September 1947 the standardization of types, size classes, and densities for forest surveys in the Lake States was achieved by a meeting of the representatives of a number of agencies and acceptance of the recommendations by most other forest agencies. This paper proposes a compromise of the few minor differences which still remain. It is hoped that all agencies will accept these standards as fast as they are able to do so. Additional copies may be obtained from the Lake States Forest Experiment Station, University Farm, St. Paul 1, Minnesota.

Definition of Types

A forest type is a forest stand characterized by the predominance of one or more key species, which make up 50 percent or more of the sawlog volume in saw-timber stands; of the cordwood volume in pole-timber stands; or of the number of trees in seedling and sapling stands. A number of additional cover types are recognized and defined below:

Commercial Forest Land

Land bearing or capable of bearing pole-timber or saw-timber stands of commercial character, and which is, or is likely to be, commercially available.

Aspen-birch type (A).--(Often called aspen type.) A stand in which a mixture of trembling or large-tooth aspen, balsam poplar (Balm of Gilead), and paper birch predominate. It may be subtyped as paper birch (AB) if that species is most common or as "off site" aspen (Ax) if the type is not capable of producing sound merchantable pulpwood.

Bottom-land hardwood type (E).--A stand on overflow or poorly drained land, in which bottom-land hardwood species, such as ash, elm, and associated wet-land hardwoods predominate. It may be subtyped as ash (Ea) if that species predominates.

Cedar type (C).--A stand in which swamp conifers predominate, with cedar the most common.

Cottonwood (Cw).--A stand in which cottonwood predominates.

Jack pine type (J).--A stand in which pine species predominate, with jack pine the most common.

Northern-hardwood type (M).--A stand in which northern-hardwood species (sugar and red maple, yellow birch, basswood) predominate. It may be subtyped hemlock (MH) if that species is the most common, or red maple (MR) if that species is most common.

Oak (O).--A stand in which the oak and hickory species predominate. It may be subtyped scrub oak (Ox) if the type is capable of producing only fuelwood material.

Red pine type (N).--A stand in which pine species predominate with red (Norway) pine the most common.

Spruce type (S).--A stand in which swamp conifers predominate with black spruce the most common.

Spruce-fir (SB).--A mixed hardwood-coniferous stand, with white spruce and balsam fir the key species.

Tamarack type (T).--A stand in which swamp conifers predominate, with tamarack the most common.

White pine type (W).--A stand in which pine species predominate, with white pine the most common.

Grass (G).--Upland grass or weed areas in the forest (not prairie) less than 10 percent stocked with commercial tree species.

Upland brush (UB).--Upland brush in forest areas less than 10 percent stocked with commercial tree species.

Lowland brush (LB).--Lowland brush on potentially commercial forest land, less than 10 percent stocked with commercial tree species.

Noncommercial Forest Land (See commercial forest land definition above.)

Nonproductive swamp (Sx).--Spruce tamarack or cedar bog in which trees will not produce standard pulpwood in 100 years.

Christmass tree bog (Sxs).--Spruce bog which is nonproductive for timber products but will make Christmas trees!

Nonforest (If further subdivision is not desired indicate as Z.)

Farm land (F).--Crop, orchard, or pasture, but not farm woodland. Fenced farm woods less than 10 percent stocked to forest trees will be considered open pasture and designated F.

Industrial and residential (I).--Platted areas used for industry or residence.

Recreational (R).--Recreational areas including forest lands where timber is reserved from cutting.

Water (L).--Lakes, ponds, and flowage.

Sand dunes (SD).--Sand dunes, including sandy beaches.

Rock outcrops (RO).--Rock outcrops including rocky beaches.

Marsh (M).--Marshland including some willow and other lowland brush.

Muskeg (K).--Muskeg bog.

Prairie grass (PG).--Prairie grass areas.

Definition of Size Classes

Saw-timber Stands

Stands of timber large enough and in sufficient quantity for sawlog operations according to regional practice. They must have at least 1,500 board feet, International 1/4-inch rule (1,300 Scribner Dec. C.), net merchantable volume per acre in saw-timber trees. Saw-timber trees of softwood species are 9.0 inches or larger d.b.h., and of hardwood species (including aspen), 11.0 inches and larger d.b.h., containing at least one merchantable 8-foot log.

- (a) Large saw-timber stands (15+) are those having more than 50 percent of net board-foot volume in large saw-timber trees, i.e., 15.0 inches and larger d.b.h.
- (b) Small saw-timber stands (9-15 or 11-15) are those having half or more of their net board-foot volume in trees less than 15.0 inches d.b.h.

Pole-timber Stands (5-9 or 5-11)

Stands made up principally of trees from 5 to 9 inches d.b.h. (5 to 11 in the case of hardwoods) which are at least 10 percent stocked. They must have a volume of at least three cords per acre of sound merchantable timber, with half of it in pole-size trees.

Restocking Stands (0-5)

Stands made up principally of seedlings (0-1) and saplings (1-5) and lacking sufficient merchantable volume to qualify as pole timber or saw timber. Two optional subclasses are recognized:

Sapling stands (1-5).--Stands of trees ranging between 1.0 inch d.b.h. and the minimum pole-timber size and occupying at least 10 percent of the growing space.

Seedling stands (0-1).--Young stands of commercial tree species from 1 foot high to 0.9 inches d.b.h. Should have at least 200 seedlings per acre.

Stocking Classes

Stocking class	Symbol	Percentage of full density	Net volume per acre			Saplings	Seedlings
			Large saw timber	Small saw timber	Pole timber		
			Thousand board feet Inter'l. 1/4-inch		Cords	Number of trees per acre	3/
Very poor <u>1/</u> (optional)	0	0-10	0.1-1.4	0.1-1.4	0.1-2.9	25-99	50-199
Poor	'	10-40	1.5-4.9	1.5-2.9	3.0-6.9	100-399	200-799
Medium	''	40-70	5.0-9.9	3.0-5.9	7.0-12.9	400-699	800-1399
Good <u>2/</u>	'''	70+	10.0+	6.0+	13.0+	700+	1400+

- 1/ A "very poor" class may be used if one is interested in mapping area and estimating volume of very scattered timber. Ordinarily, land in this class would be better shown as grass, brush, or nonforest.
- 2/ A "very good" classification with symbol ''' is optional where the agency doing the mapping desires to separate the exceptional stands. This would apply to large saw-timber stands with 15 M board feet or more per acre, small saw-timber stands with 10 M board feet or more, pole stands with 20 cords or more, or restocking areas with practically full cover.
- 3/ One-half of the number of trees in each class may be used for plantations where stocking is quite uniform.

Classification Procedure

Arranging Symbols

The three main classifications, type, size and stocking, will be shown by (a) letters, (b) numbers, and (c) prime marks; for example, M '' 11-15 to indicate northern hardwood small saw timber of medium stocking. In stands of more than one layer, the main stand should be indicated by placing it in top position thus:
M ''' 0-5 .
 A ' 9-15

If a subordinate species classification in any story is desired, it may be shown to the right of the principal story classification. Thus A '' 11-15 will show an
 NW '' 1-5

aspen medium-stocked, small saw-timber stand with a mixture of red and white pine reproduction, the red pine predominating. This should provide a most detailed stand structure picture in case it may be desired in some detailed survey and still indicate the main stand for summarization purposes. As a rule, however, the restocking class need be mapped only when it forms the main stand.

Detail in Mapping

Use of extreme detail in mapping is undesirable. As a general rule, it is recommended that noncontrasting condition classes be mapped to a minimum of 10 acres and contrasting condition classes to a minimum of 2 $\frac{1}{2}$ acres. Conditions are contrasting if the change is:

- (a) From commercial to noncommercial forest or from either of these to nonforest area!
 - (b) From one of the following groups to another:
 - (1) pine
 - (2) coniferous swamp and spruce-fir
 - (3) hardwoods.
 - (c) From one size class to another two steps removed. (For example: restocking to saw timber. When stand is in borderline condition, classify it to the size class which shows the highest merchantable volume.)
 - (d) From one stocking class to another two steps removed in pole and saw-timber size classes. (Example: from poor to good stocking.)
- Density is not considered contrasting within the restocking size class.
- (e) From single to two-storied stand. Change from two to three-storied stand is not considered contrasting.

Some exceptions to these general rules might be made when the contrast is significant although not so indicated by the rules. For example, when stands of small poles are adjoining stands of advanced small saw timber or when well-defined type boundaries exist within the hardwood group.

Photo Identification and Classification

Identification of cover types may be aided by the use of keys or stereograms. Frequent field checking is necessary. Experience has shown that the twelve forest cover types can be recognized on aerial photos but this becomes difficult when species are well mixed.

Size classification can be satisfactorily based upon total height and crown diameters. Total height can be judged under stereoscope by comparison with adjacent stands checked by height measurements on the photo or on the ground. Crown diameter can be judged by crown texture checked by occasional photo measurements.

Percent of crown closure can be estimated by comparison with standard patterns.

A guide (table 3) has been prepared to assist the photo interpreter to express total height, crown diameter, and percent of crown closure in terms of size and stocking classes. This, in combination with field checking enables him to satisfactorily classify forest cover on the photos with a minimum of measurements.

Cover Mapping on the Ground

The uniform classification of size and stocking classes on the ground is facilitated for one who cannot accurately estimate volumes, by use of a second guide (table 4). After obtaining average total height, the diameter class within or above which over 50 percent of the stand volume occurs, and a quick count of trees on a plot, the cruiser can consult the guide for size and stocking classifications. This table applies to average run of stands and average merchantability. When an understory is being classified, the number of trees in the overstory should not be included in the count.